Appendix A

Biological Assessment

for the 2004 Fire Management Plan for Mojave National Preserve,
including habitat for the threatened desert tortoise (*Gopherus agassazii*)
(October 15, 2004 revision)

Contents:

1.0 Introduction and Background

Mojave National Preserve was established by the California Desert Protection Act in 1994 to preserve outstanding natural, cultural, and scenic resources while providing for scientific, educational, and recreational interests. Included within the 1.6-million acre Preserve is 800,000 acres of designated critical habitat for the threatened desert tortoise (*Gopherus agasizii*). Figure B1.

A species list provided by the U.S. Fish and Wildlife Service in June 2004 indicates that there are four federally listed species that may occur in the vicinity of Mojave National Preserve: southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), desert tortoise (*Gopherus agassizii*), and Mojave tui chub (*Gila bicolor mohavensis*). The two bird species are riparian obligates and it is unlikely that either is found inside the Preserve due to the lack of riparian habitat. The Mojave tui chub is known from ponds in the Zzyzx area of the Preserve. The Fire Management Plan prohibits the drafting of water from those ponds for fire suppression and prohibits the use of Class A foam near the ponds. Furthermore, the area surrounding the ponds was investigated for potential post-fire watershed effects on the ponds and it was concluded that the vegetation, substrates, and slopes do not pose a post-fire risk to the Mojave tui chub or its habitat. Environmental concerns related to the southwestern willow flycatcher, least Bell's vireo, and Mojave tui chub are addressed in the Environmental Assessment prepared for the Fire Management Plan and formal consultation is not requested for these species. The focus of this Biological Assessment and subsequent formal consultation is the desert tortoise.

The Fire Management Plan and its associated documents have been prepared to implement a range of fire management strategies to achieve the goals of the Mojave National Preserve General Management Plan. Additionally this new Fire Management Plan is needed to comply with new federal policies and directives requiring federal land managing agencies to improve consistency in their approach to fire management.

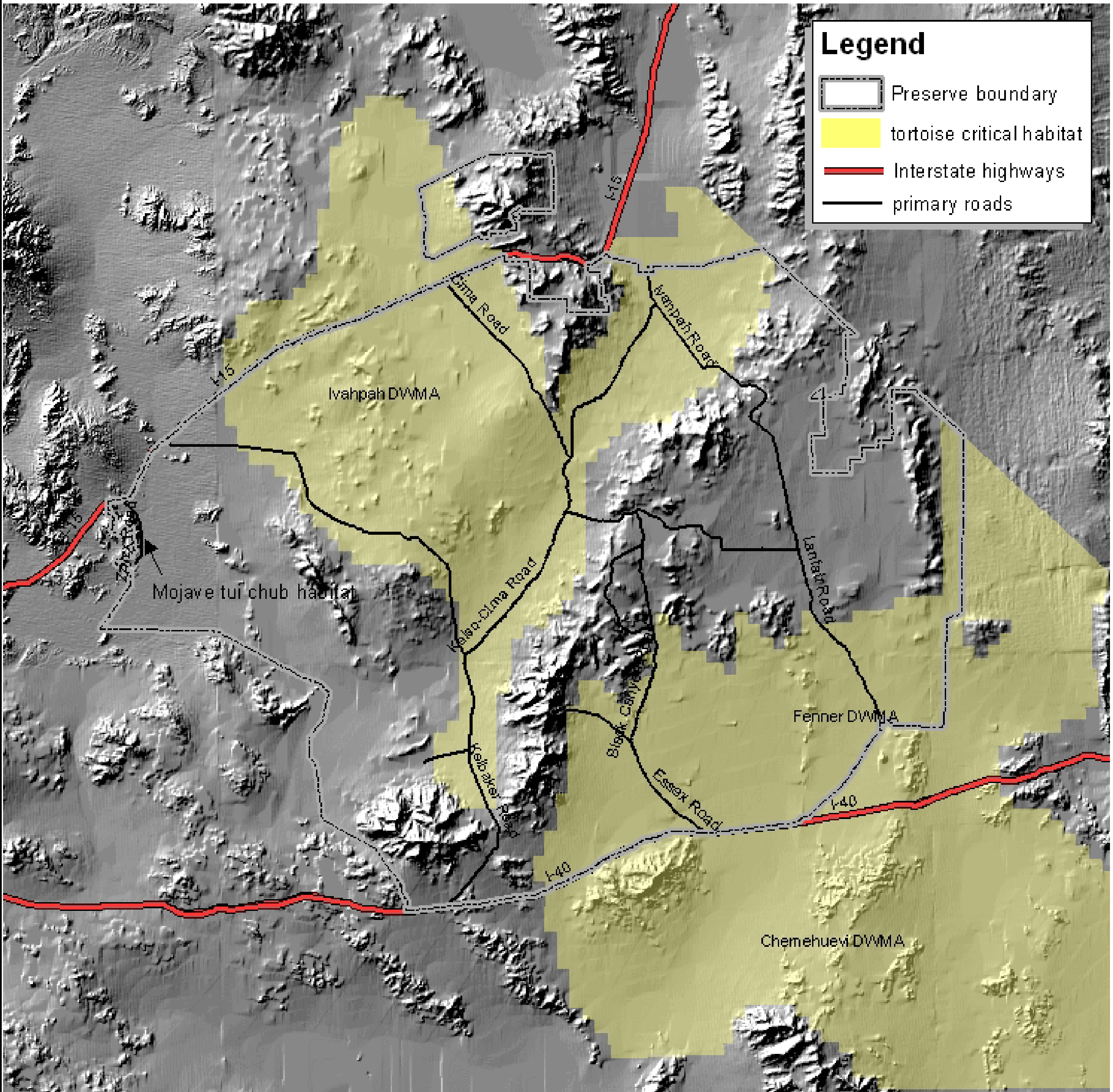
Actions carried out for the general management of the Preserve required consultation under Section 7 of the Endangered Species Act (ESA); 7 U.S.C. 136; 16 U.S.C. 460 et seq. (1973). A Biological Opinion was issued by the United States Fish and Wildlife Service for the General Management Plan in 2001. The Fire Management Plan requires a separate Biological Opinion because the plan details specific policies, procedures and actions and constitutes a federal action not fully assessed in the prior Opinion.

Mojave National Preserve
California
Fire Management Plan

National Park Service
U.S. Department of the Interior

Figure B1: Critical Habitat

Tortoise critical habitat is mapped and labelled according to the recovery units identified in the 1994 Desert Tortoise (Mojave Population) Recovery Plan.



0 5 10 20 30 40 Miles

Produced by S. Dingman, Biologist, Mojave National Preserve **Julu 2004**

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1.1 Endangered Species Act Requirements

The range of the desert tortoise includes the Mojave and Sonoran deserts in southern California, southern Nevada, Arizona, the southwestern tip of Utah, and Sonora and northern Sinaloa, Mexico. The Mojave population of the desert tortoise is an administrative designation for animals living north and west of the Colorado River. The Mojave population was listed in 1990 as threatened under the Endangered Species Act due to sharp declines in desert tortoise numbers in many areas. This decline is attributed to direct and indirect human-caused mortality. Impacts include destruction, degradation, and fragmentation of tortoise habitat as a result of urbanization, agricultural production, livestock grazing, mining, and roads. In 1994, critical habitat for the Mojave population was designated and a recovery plan for the desert tortoise was issued by the USFWS.

Section 9 of the Endangered Species Act of 1973 (ESA), as amended, prohibits the take (ie. harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct) of a listed species without special authorization. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Section 7(a) of the ESA requires Federal agencies such as the National Park Service (NPS) must formally consult with USFWS when proposing a project which may result in take of a listed species. The USFWS evaluates the proposed project and issues a Biological Opinion (BO) on whether the project will destroy or adversely modify habitat, jeopardize the continued survival of the species, and specify terms and conditions under which take may occur. The USFWS estimates the amount of take incidental to an agency action, which is then exempted from the prohibitions of section 9 of the Endangered Species Act, provided that the incidental take is in compliance with the terms and conditions of the incidental take statement in the Biological Opinion.

1.2 Purpose

The purpose of this biological assessment is to provide the necessary information to the USFWS for the issuance of a Biological Opinion on the implementation of the Fire Management Plan, in order to protect the desert tortoise.

1.3 Consultation History

Continuing federal actions that might pose a threat to the desert tortoise are discussed in two separate biological opinions prepared by the U.S. Fish and Wildlife Service. The first was issued in 1998 for individual NPS activities that disturb less than 2 acres of desert tortoise habitat (1-8-98-F-17). To date, less than 4.0 acres have been authorized for disturbance. No desert tortoises have been killed a result of these activities. The second was issued in 2001 for a variety of management actions proposed under the park's General Management Plan, including:

- fire management - under a full suppression strategy for the entire park. A revision to this activity is hereby proposed, as described in the Fire Management Plan.
- hazardous materials
- inventorying, monitoring, research, and permits
- natural resource collections
- sand and gravel for road maintenance
- management of desert tortoises
- burro removal
- salt cedar removal
- interpretive facilities
- access and circulation
- camping, backcountry and Wilderness use, backcountry use and roadside vehicle camping, camping at high use areas, and camping in desert tortoise critical habitat
- rights-of-way and easements
- railroads
- wildlife guzzlers
- hunting
- equestrian use
- mineral development
- ranching developments
- cattle grazing

The opinion issued by the U.S. Fish and Wildlife Service concluded that most of the actions that the NPS proposed would improve the condition of habitat within the Mojave National Preserve and reduce the level of mortality of desert tortoises; consequently, implementation of the GMP would benefit the survival and recovery of the desert tortoise. Additionally, many of the actions described in the GMP required additional consultation for the specific actions that the NPS permits, funds, or undertakes in the future. This Fire Management Plan is one such action.

As this is the first Fire Management Plan prepared for Mojave National Preserve, this is the first consultation with the U. S. Fish and Wildlife Service specific to fire management planning, including fire suppression, wildland fire use, fuel management, and post-fire treatments.

2.0 Proposed Action

The Mojave National Preserve fire management program goals and objectives have been developed in alignment with the Preserve General Management Plan goals, Department of the Interior policy, National Park Service policy, and the National Fire Plan. The fire management program goals and objectives are listed in descending order of their priority:

1. Protect human life and property.
   a) Ensure the fire program is in compliance with the Federal Wildland Fire Management Policy, National Wildfire Coordinating Group Guidelines and Incident Qualification Guidelines prior to the established fire season.

b) Develop and implement Fire Education and Prevention Outreach programs for local communities and fire agencies.
c) Develop and implement hazard fuel treatments to reduce or alter fuel loadings, where necessary to protect park owned structures.

2. Minimize negative impacts of fire and fire management activities on natural and cultural resources.
   a) Identify management concerns for protecting site-specific resources during wildland and prescribed fires.
   b) Implement "Minimum Impact Suppression Tactics" whenever possible.
   c) Develop and implement standard operating procedures for fire management operations in desert tortoise habitat.
   d) Provide training and experience for National Wildfire Coordinating Group qualified Resource Advisors with expertise in specific park natural and cultural resource needs, including desert tortoise. Ensure that a qualified Resource Advisor is assigned to each fire incident that exceeds 10 acres in size or requires extended attack.

3. Provide for the safe and efficient management of all fires.
   a) Define management responsibilities, organizational level and decision-making processes for all fires.
   b) Maintain a fire management organization during the fire season that will contain 95% of all unwanted fires in the park during initial attack.
   c) Develop a "Wildland Fire Implementation Plan, Stage 1" for all wildland fires used for resource benefit, within 2 hours of detection and size-up. Develop "Stage 2" and "Stage 3" plans as required by Federal Fire Policy.
   d) Make appropriate notifications for all fires to assure that park neighbors and partners are informed of any fire situation that could pose a risk to private property or transportation corridors.

4. Develop a smoke management program.
   a) During all fire incidents, use strategies that will not exceed the state standards for carbon monoxide and particulates in smoke sensitive areas.
   b) Zone suppression and wildland fire use areas to protect visibility along major transportation corridors.
   c) Promptly notify California Department of Transportation and Nevada Department of Transportation for any fires that are likely to affect visibility on interstates and state highways.

5. Develop fire management planning strategies using science-based information and best professional judgment.
   a) Systematically and opportunistically monitor and evaluate the effects of fire on park ecosystems.
   b) Identify and prioritize fire research needs and seek funding as appropriate.
   c) Actively acquire and manage the best available scientific information to implement the Fire Management Plan.

6. Recognize fire as a natural process within the Preserve.
   a) Zone for wildland fire use in areas where unplanned natural ignitions do not pose an unreasonable risk to life, property, or resources.
   b) Develop a "Wildland Fire Implementation Plan, Stage 1" for all wildland fires used for resource benefit, within 2 hours of detection and size-up. Develop "Stage 2" and "Stage 3" plans as required by Federal Fire Policy.
   c) Minimize the probability of negative fire effects outside the normal fire regime.

7. Promote an interagency approach to managing fire.
   a) Review, update and initiate cooperative agreements as required to assure that interagency approaches to managing wildland fires are implemented in a safe and efficient manner.
   b) Ensure that local resources from cooperating agencies are used when appropriate to reduce operational costs.

8. Promote public understanding of fire management programs and objectives.
   a) Develop and implement Fire Education and Prevention Outreach programs for local communities and fire agencies.
   b) Ensure that a qualified Information Officer is assigned to each fire incident that exceeds 100 acres in size or requires extended attack.

To achieve these objectives, the fire management plan includes three fire management strategies: suppression, wildland fire use, and non-fire fuel treatments (Figure B2). Prescribed fire is not proposed for implementation at Mojave National Preserve because many desert plant communities are fire intolerant, the flammability of low elevation areas has been increased by the invasion of non-native grasses, and the effects of fire on desert communities is poorly understood at this time. Fire history is included in Figure B2 to provide a basis for anticipating the potential frequency of fire occurrence for the ten-year life of this Fire Management Plan based on the fire frequency of the last ten years, assuming that this period of record most accurately reflects the fuel and climate conditions for the next ten years.

2.1 Suppression

Wildland fire suppression is an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Under this Fire Management Plan, 1,246,400 acres (approximately 78% of the Preserve) are zoned for suppression, primarily for the protection of desert tortoise habitat, structures, historic resources, private lands, rare plant species, and lands where the flammability of the vegetation has been altered by invasive grasses. Additionally, all human caused ignitions will be suppressed regardless of their location. Approved suppression tactics consist of fire engines operating on pre-existing roads, hand crews, and helicopters for crew transport and water drops. Hand crews use hand and power tools to cut, scrape or wet down vegetation to create a barrier to fire spread. Handline construction will be minimal and minimum impact suppression techniques will be employed to the fullest extent possible. Engines are used to apply water or soap-based surfactants (Class A foam) to vegetation. Helicopters may use unimproved landing zones, or make minimal improvements (e.g. remove large rocks) to create a landing zone, as needed to conduct fire suppression operations. The following fire fighting tactics are not approved for use in Mojave National Preserve: heavy equipment (dozers, backhoes, loaders, graders), chemical fire retardant (except for Class A foam), and off-road operation of vehicles including engines.

Resource Advisors, personnel trained to identify and mitigate suppression impacts and recommend post-fire rehabilitation measures, will assess burn areas that exceed 100 acres or fires of any size that occur in sensitive habitats. Emergency stabilization and rehabilitation measures will be implemented consistent with agency policy at that time.

2.2 Wildland Fire Use

Wildland fire use is the management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP).

While there is much that we do not know about the role of fire in the Mojave Desert, we do know that there were natural ignitions and burnable vegetation prior to European settlement. Thus fire must play some role in shaping the vegetation communities we see today. While the recent invasion of non-native plants has increased the flammability of the landscape in general, the effects of this invasion are not consistent across the landscape. Many of the higher elevation plant communities have a native perennial grass component that occupies the spaces between shrubs, so the flammability of these communities is less affected by the invasion of non-native grasses. In other areas, the non-native plants have difficulty establishing a continuous fuel bed on the shifting substrates that characterize much of the western third of the park, so the flammability of these areas are less effected by their presence. Furthermore, effective fire suppression in some areas is extremely difficult because of the inaccessibility of the terrain. This is especially true of areas that are designated Wilderness as their suitability for inclusion in Wilderness was due to their remoteness, inaccessibility, and lack of human alterations (such as roads). Ideologically, the preservation of both wildness and naturalness in Wilderness is best served by allowing fires started by lightning to burn naturally provided that the fires do not pose a risk to human life, property, biological resources, or cultural resources.

Under this Fire Management Plan, approximately 342,900 acres of designated Wilderness are zoned for wildland fire use. These wildland fire use areas are located in the higher elevation lands found at Clark Mountain, Piute Range, Castle Peaks, Woods Mountains, Hackberry Mountains, Providence Mountains, and Granite Mountains as well as the sparsely vegetated lands along the park’s western boundary at Kelso Dunes, Kelso Mountains, Devil’s Playground, Cowhole Mountains, Old Dad Mountains, and Soda Dry Lake. Some areas of designated wilderness are not zoned for wildland fire use; instead they are zoned for suppression for the protection of desert tortoise critical habitat, historic resources, structures, and private lands.

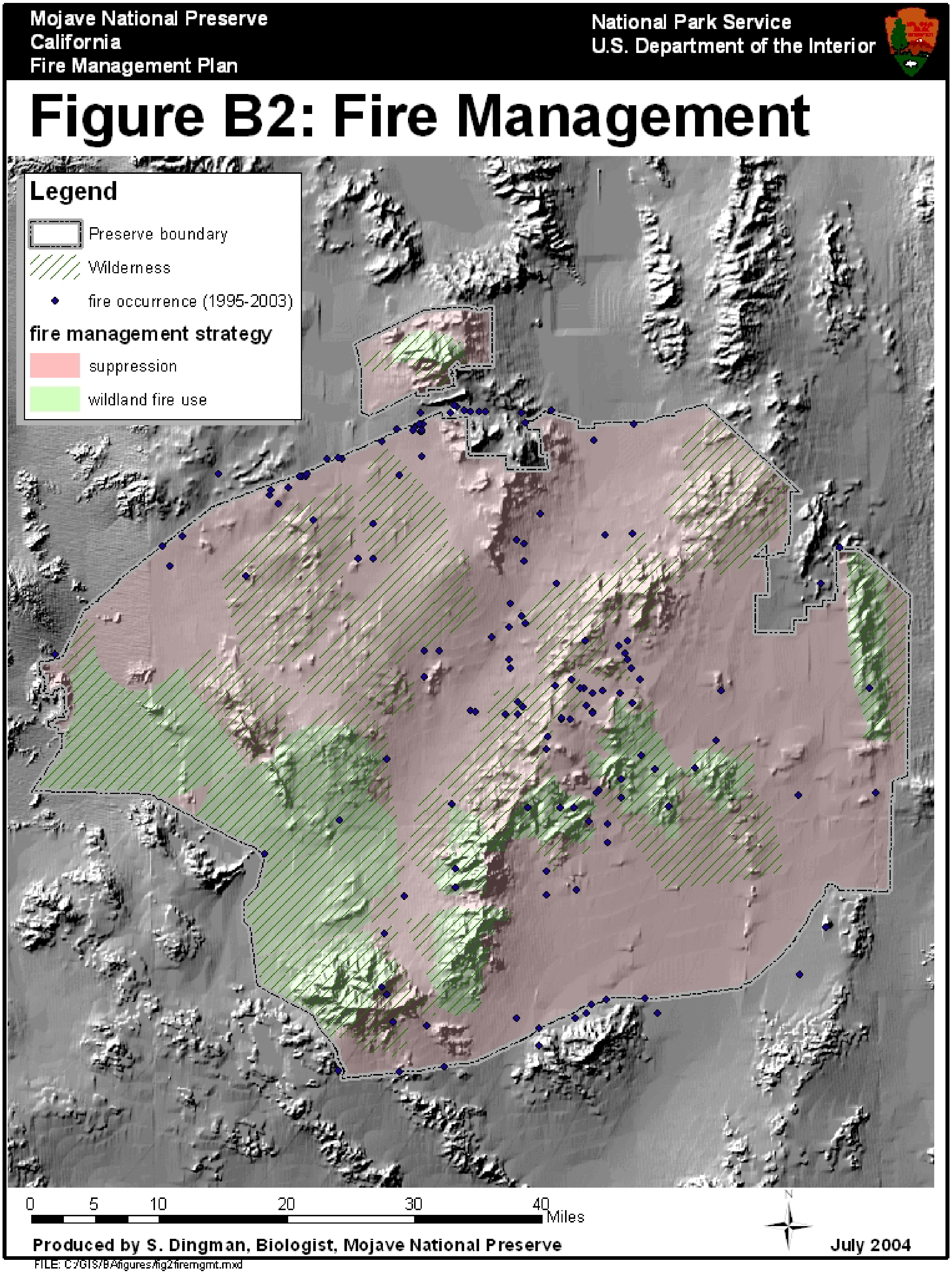
2.3 Non-fire fuel treatments

Non-fire treatments for fuels include mechanical, chemical, biological and manual methods. These treatments may be used individually, with or without fire, and/or in combination to achieve resource benefits and managements goals such as hazard fuels reduction, ecosystem restoration, and maintaining ecosystem health.

Mechanical fuel reduction is the only non-fire fuel treatment identified for implementation in this Fire Management Plan. Mechanical fuel management uses hand and/or power tools to cut or remove live or dead vegetation to decrease either the volume or flammability of the fuels. Fuel treatments are planned activities that are conducted before a fire occurs in order to reduce fire risk. The only fuel treatments proposed in Mojave National Preserve are hazard fuel reduction immediately adjacent to park owned structures and hazard fuel reduction in the campsites in the Mid-Hills Campground. Total area affected by these hazard fuel reductions is less than 100 acres and all treatments will take place in previously disturbed sites in developed areas. Treatments would take place primarily during December through February. Most sites will require one initial treatment to create defensible space next to structures and maintenance treatment every few years depending on the growing conditions during the intervening years.

The park will also incorporate hazard fuel reduction and fire preparedness requirements into various permits and agreements that involve structures inside of Mojave National Preserve. Examples include utility rights-of-way substations and communication sites, as well as the research and education facilities operated by California State University system at Zzyzx Soda Springs and the University of California's Granite Mountains Natural Reserve. Private or public inholdings located within the Preserve that are not legally subject to permits or agreements cannot be required to adhere to fuel reduction. To encourage such owners/operators to voluntarily implement fire prevention measures, the Preserve will implement a fire prevention and education campaign.

The Preserve has no plans to employ biological means to reduce fuels. This includes the use of cattle or other introduced grazing animals. Former grazing allotments within the Preserve were purchased by a third party conservation group and subsequently donated to the Preserve. By agreement with these parties, these allotments are permanently retired and grazing will not be reintroduced.


Mojave National Preserve
California
Fire Management Plan
National Park Service
U.S. Department of the Interior
Figure B2: Fire Management
Legend
Preserve boundary
Wilderness
fire occurrence (1995-2003)
fire management strategy
suppression
wildland fire use
0
5
10
20
30
40
Miles
N
Produced by S. Dingman, Biologist, Mojave National Preserve
July 2004
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3.0 Species Account

The following life history summary is excerpted from Boarman (2002):

> The desert tortoise is a medium-sized, terrestrial turtle in the family Testudinidae. The shell is light brown to very dark brown with brown to orange or yellow in the centers of scutes, particularly in young animals. The skin is dry and scaly with thick, stumpy, elephantine hind legs. The gular horn is a projection located at the anterior end of the plastron and is most pronounced in adult males. Adult males weigh 0.04 – 10+ lbs (20-5000+ g) and range in carapace length from about 1.4 inches (35 mm) to 11-16 inches (280-400 mm). No other terrestrial turtle occurs within the range of the desert tortoise.
>
> Desert tortoises are long-lived with delayed sexual maturity. Some individuals begin reproducing when 7.4 inches (180 mm) long, which they attain when about 12-15 years old. The majority do not begin reproducing until they reach 8.2 inches (208 mm), at approximately 12-20 years old (Turner and Berry 1984, Turner et al. 1986). Maximum longevity in the wild is likely to be about 50-70 years, the norm being 25-35 years (Germano 1992 and 1994). The average clutch size is 4.5 eggs (range 1-8), with 0-3 clutches deposited per year (Turner et al. 1986). Clutch size and number probably depend on female size, water, and annual productivity of forage plants in the current and previous year (Turner et al 1984 and 1986, Henen 1997). The interaction of longevity, late maturation, and relatively low annual reproductive output causes tortoise populations to recover slowly from natural or anthropogenic decreases in density. To ensure population stability or increase, these factors also require relatively high juvenile survivorship (75-98% per year), particularly when adult mortality is elevated (Congdon et al. 1993).
>
> Most eggs are laid in spring (April – June) and occasionally in fall (September – October). Eggs are laid in sandy or friable soil, often at the mouth of the burrow. Hatching occurs 90-120 days later, mostly in late summer and fall (mid August – October). Eggs and young are untended by the parents. Tortoise sex determination is environmentally controlled during incubation (Spotila et al. 1994). Hatchlings develop into females when the incubation temperature is greater than 89.3°F (31.8°C) and males when the temperature is below that (Spotila et al 1994). Mortality is higher when incubation temperatures are greater than 95.5° F (35.3°C) or less than 78.8°F (26.0°C). The sensitivity of embryonic tortoises to incubation temperature may make populations vulnerable to unusual changes in soil temperature (e.g. from changes in vegetation cover), but there are no data available from the field that can be used to test this hypothesis.
>
> Tortoise activity patterns are primarily controlled by ambient temperature and precipitation (Nagy and Medica 1986, Zimmerman et al 1994). In the East Mojave, annual precipitation occurs in both summer and winter, providing food and water to tortoises throughout much of the summer and fall. Tortoises may

also be active during periods of mild or rainy weather n summer and winter. During inactive periods, tortoises hibernate, aestivate, or rest in subterranean burrows or caliche caves, and spend approximately 98% of the time in these cover sites (Marlow 1979, Nagy and Medica 1986). During active periods, they usually spend nights and the hotter part of the day in their burrows; they may also rest under shrubs or in shallow burrows. Tortoises use an average of 7-12 burros at any given time (Barrett 1990, Bulova 1994, TRW Environmental Safety Systems Inc, 1997); some burrows may be used for relatively short periods of time and then are replaced by other burrows. Tortoises sometimes share a burrow with several other tortoises (Bulova 1994).

Tortoises eat primarily annual forbs, but also perennials (ie. cacti and grasses). In the east Mojave Desert, tortoises showed a preference for woody bottle washer (*Camissonia boothii)*, popcorn flower (*Cryptantha angustifolia)*, desert dandelion (*Malacothrix glabrata)*, beavertail (*Opuntia basilaris)*, desert chicory (*Rafinesquia neomexicana)*, Mediterranean grass (*Schismus barbata)*, wire lettuce (*Stephanomeria exigua)* and other species (Avery 1998). Although they will eat non-native plants, tortoises generally prefer native forbs when available (Jennings 1993, Avery 1998, Esque 1994). The dietary preference may place them at a nitrogen and water deficit that may be exacerbated by drought. Plants also play important roles in stabilizing soil and providing cover for protection form predators and heat.

The tortoise mating system is probably polygynous, and may be polyandrous, although DNA fingerprinting to analyze patters of paternity has not been conducted. Choice of mate is mediated by aggressive male-male interactions and possibly by female choice (Niblick et al. 1994).

Tortoise activities are concentrated in core areas, known as home ranges. These home ranges overlap; because tortoises do not defend a specific, exclusive area, they o not maintain territories. Home range sizes have been measured at 10-450 acres (4-180 ha) and vary with sex, age, season, and density or availability of resources (Fish and Wildlife Service 1994). Whereas home range sizes may vary from year to year, it is not known at what rate tortoises change their home range location and size over the course of their life. Over their entire life span, an individual tortoise may require considerably larger areas than that used in any one year.

Vegetation and topography in tortoise habitat are variable. In one study in the western Mojave Desert, the greatest population densities were found in creosote bush scrub with lower densities occurring in Joshua tree woodland and Mojave-saltbush-allscale scrub. Major topographical features used by tortoises include flats, valleys, bajadas, and rolling hills generally from 2000-3300 ft (600-1000 m) elevation and occasionally above 4100 ft (1250m) as reported by Weinstein (1989). Tortoises typically avoid plateaus, playas, sand dunes, steep slopes (>20%) and areas with many obstacles to free movement. They prefer surfaces covered with sand and fine gravel versus coarse gravel, pebbles, and desert pavement (Weinstein 1989). Friable soil is important for digging burrows but when friability is similar, productivity of plants is more important (Wilson and Stager 1992)

The life history strategy of the desert tortoise is based on longevity and iteroparity. Under natural conditions, this strategy allows the species to persist in spite of the stresses of extremely harsh and variable environments. Desert tortoise populations can withstand high rates of natural juvenile morality as long as the probability of adults surviving each year does not drop below approximately 98%. Thus, maintaining high survivorship of adult desert tortoises is the key factor in the recovery of this species. (Fish and Wildlife Service 1994)

Based on genetic and morphological criteria, *G. agassizii* is divided into at least two well-differentiated entities, one in the Sonoran Desert in Arizona and one in the Mojave region. A third may exist in Sonora and Sinaloa, Mexico. Furthermore, the Mojave population is divided into six evolutionarily significant units (ESU) that represent significant adaptive variation within the species based on distribution, natural history, morphometrics, and genetics. Such ESUs are provided protection under Sections 2(b)(c) and 3(15) of the Endangered Species Act. The ESUs are referred to as recovery units.

Most of Mojave National Preserve lies within the Eastern Mojave Recovery Unit, while a small area along the parks southwestern boundary lies within the Northern Colorado Recovery Unit and a small area along the parks northeastern boundary lies within the Northeastern Mojave Recovery Unit.

Descriptions of these three recovery units are summarized in Table B1 and detailed descriptions below are excerpted from the Desert Tortoise Recovery Plan (Fish and Wildlife Service 1994).

> <u>Eastern Mojave Recovery Unit</u>: Primarily in California, this recovery unit also extends into Nevada in the Amargosa, Pahrump, and Piute valleys. In the eastern Mojave recovery unit, desert tortoises are often active in late summer an early autumn in addition to spring because this region receives both winter and summer rains and supports two distinct annual floras on which they can feed. These desert tortoises occupy a variety of vegetation types and feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. They den singly in caliche caves, bajadas, and washes. This recovery unit is isolated from the western Mojave by the Baker Sink, a low-elevation, extremely hot and arid strip that extends from Death Valley to Bristol Dry Lake. This area is generally not suitable for desert tortoises. Desert tortoises have both the California and the southern Nevada mtDNA haplotype and the California shell type. They are also differentiated from desert tortoises in the northeastern Mojave recovery unit at several allozyme loci.

> <u>Northern Colorado Recovery Unit</u>: This recovery unit is located completely in California. Here desert tortoises are found in the valleys, on bajada and desert pavements, and to a lesser extent in the broad, well-developed washes. They feed

on both summer and winter annuals and den singly in burrows under shrubs, in intershrub spaces, and rarely in washes. The climate is somewhat warmer than in other recovery units with only two to 12 freezing days per year. The tortoises have the California mtDNA haplotype and phenotype. Allozyme frequencies differ significantly between this recovery unit and the Western Mojave, indicating some degree of reproductive isolation between the two.

Northeastern Mojave Recovery Unit: This recovery unit is found primarily in Nevada, extending into California along the Ivanpah Valley [inside Mojave National Preserve] and into extreme southwestern Utah and northwestern Arizona. Desert tortoises here are generally found in Creosote Bush Scrub communities of flats, valley bottoms, alluvial fans, and bajadas, but they occasionally use other habitats such as rocky slopes and Blackbush Scrub. Two or more desert tortoises often den together in caliche caves in bajadas and washes, and they typically eat summer and winter annuals, cacti, and perennial grasses. Three mtDNA haplotypes are found in this recovery unit, but they exhibit low allozyme variability with relatively little local differentiation.

The Desert Tortoise Recovery Plan describes a strategy for the recovery and delisting of the Mojave population of the desert tortoise, including 1) identification of six recovery units, 2) establishment of a system of Desert Wildlife Management Areas (DWMA) within recovery units, and 3) development and implementation of specific recovery actions within DWMAs.

Mojave National Preserve includes portions of two recommended DWMAs outlined in the 1994 Desert Tortoise Recovery Plan: Ivanpah DWMA in the northern area of the Preserve and Fenner DWMA in the southeastern area of the Preserve (Table B2). These areas are identified as "critical habitat," geospatially delineated using GIS, and provide one of the primary criteria for prescribing fire management strategies for Mojave National Preserve.

In 2002, the U.S. Fish and Wildlife Service coordinated a regional monitoring program within the six recovery units using range-wide implementation of line distance sampling (Medica 2000) based on a pilot study completed in 2001. The objective of this monitoring effort is to provide a reliable estimate of density among all the DWMAs (Woodman 2003) and findings are summarized in the 2002 Line Distance Report. Relevant 2002 findings are as follows: in Fenner DWMA there were 58 transects for a total of 232 kilometers walked with 13 live and 172 dead tortoises encountered; in Ivanpah DWMA there were 112 transects for a total of 448 kilometers walked with 36 live and 182 dead tortoises encountered. The report does not include density estimates.

The Preserve also includes the Goffs Permanent Study Plot, established in 1977 and sampled for tortoises in 1977, 1980, 1983-86, 1990, 1994, and 2000. A report from the U.S. Geological Survey (Berry 2000) summarizes the trend of this population. Between 1980 and 1994, from 220 to 296 tortoises were registered on the plot in each of the sample years. In 2000, only 30 live tortoises were found, representing only 10.1-13.6% of the previously reported population sizes. The shell-skeletal remains of 393 tortoises were found on the plot in 2000. Demographic analysis

Table B1. Summary comparison of three desert tortoise recovery units that include lands within Mojave National Preserve.

Recovery Unit	Vegetation	Plant Foods	Physical Habitat	Burrow Sites	Denning Behavior
Eastern Mojave	Big Galleta-Scrub Steppe, Succulent Scrub (Yucca, Opuntia sp.), Creosote Bush Scrub, Cheesebush Scrub, Indian Rice Grass Scrub-Steppe	Summer and winter annuals, cacti, perennial grasses, herbaceous perennials	Flats, valleys, fans, bajadas, rocky slopes	Some caliche caves, bajadas, washes	single
Northern Colorado	Succulent Scrub (Fouquieria, Opuntia, Yucca), Blue Palo Verde-Smoke Tree, Woodland, Creosote Bush Scrub (lava flows)	Summer and winter annuals	Flats, valleys, bajadas, rocky slopes, small washes	Under shrubs, in intershrub spaces, few in washes	single
Northeastern Mojave	Creosote Bush Scrub, Big Galleta Scruib-Steppe, Desert Needlegrass Scrub-Steppe, Blackbush Scrub	Summer and winter annuals, cacti, perennial grasses	Flats, valleys, fans, bajadas, rocky slopes	Caliche caves, bajadas, washes	multiple

Table B2. Recommended Desert Wildlife Management Areas, their densities, and degree of threat (1=low, 5=extremely high) that include lands within Mojave National Preserve.

Recovery Unit	Desert Wildlife Management Area (DMWA)	Estimated tortoise density (adults/mi^2)[a]	Degree of threat[a]
Eastern Mojave and Northern Colorado	Fenner	10-350	3
Eastern Mojave and Northeastern Mojave	Ivanpah	5-250	3

[a] As of 1994 when published in the Desert Tortoise Recovery Plan (Fish and Wildlife Service 1994).

of the 2000 plot data indicates that there was a decline of 94-95% of the female tortoises of breeding size. The majority of the tortoises on the Goffs plot showed signs of shell lesions typical of cutaneous dyskeratosis, indicating that shell disease may be playing a role in the high mortality rates observed on the Goffs study plot.

Lands in the Preserve outside of the Ivanpah and Fenner recommended DWMAs have not been systematically surveyed for tortoise; however, we need to consider the potential for a wildland fire use strategy to impact tortoises not accommodated in the critical habitat areas. To better understand how tortoises may use other areas of the Preserve, a simple habitat suitability model was constructed using GIS based on existing geospatial data. This habitat suitability model is a theoretical model used to better understand potential impacts with the following caveats: the geospatial data used in the model may include inaccuracies thus introducing inaccuracies in the model; there may be other habitat parameters that are more important in determining habitat suitability but were not considered; and finally, this model has not been statistically validated nor has it been verified in the field. The three habitat parameters included in our habitat suitability model were: elevation, slope, and vegetation cover. Literature reviews (Boarman 2002, U.S. Fish and Wildlife Service 1994, Weinstein 1989) were used to determine a range of values reported as suitable or marginally suitable for tortoise. Based on the literature review, each value in each parameter was assigned a score of 0, 1, or 2 where 0 represents a value that is not suitable for tortoise and is stated as such in the literature (ie. negative), 1 represents a value that is marginally suitable or is not mentioned in the literature (ie. neutral), and 2 represents a value that is suitable and is stated as such in the literature (ie. positive). The assigned scores for each habitat value are listed in Table B3.

To construct the geospatial model, each habitat parameter was initially treated as a separate raster map. Each cell in each parameter map was assigned a score based on its value, as listed in Table B3. After all three maps had been individually scored, they were summed together into one additive raster map where each cell has a value that is the sum of the slope, elevation, and vegetation scores for that geographic location. This yielded a single map covering the entire Preserve where each cell has a score of 0 – 6, where a score of 0 represents habitat that is unsuitable, a score of 6 represents habitat that is most suitable, and 1-5 represent some intermediate value of suitability. The raster map was then converted to a vector map and was intersected with the fire treatment map to yield acres of habitat of each score in each treatment area.

This habitat suitability model shows 40,927 acres (16,563 ha) of highly suitable (score = 6) habitat that is zoned for wildland fire use, and 20,071 acres (8123 ha) of suitable (score = 5) habitat that is zoned for wildland fire use. As shown in Figure B3, most of the score 6 habitat is directly north of the Kelso Dunes in an area known as the Kelso Mountains and the Devil's Playground or between the Kelso Dunes and Granite Mountains. The Devils Playground is characterized by small disjunct mountains that have sandramps along the west and south sides where loose particles have accumulated. The vegetation of this area is classified as creosote bush mixed scrub and the elevation and slopes are optimal for desert tortoise; however, the loose substrates that characterize much of this area might actually preclude tortoise occurrence. The area between the Kelso Dunes and Granite Mountains likewise is largely composed of loose substrates and it also includes major utility corridors and a roadway. No other large contiguous areas of highly suitable habitat (score = 5 or 6) were identified in the wildland fire use areas.

Table B3. Values assigned for construction of a tortoise habitat suitability model.

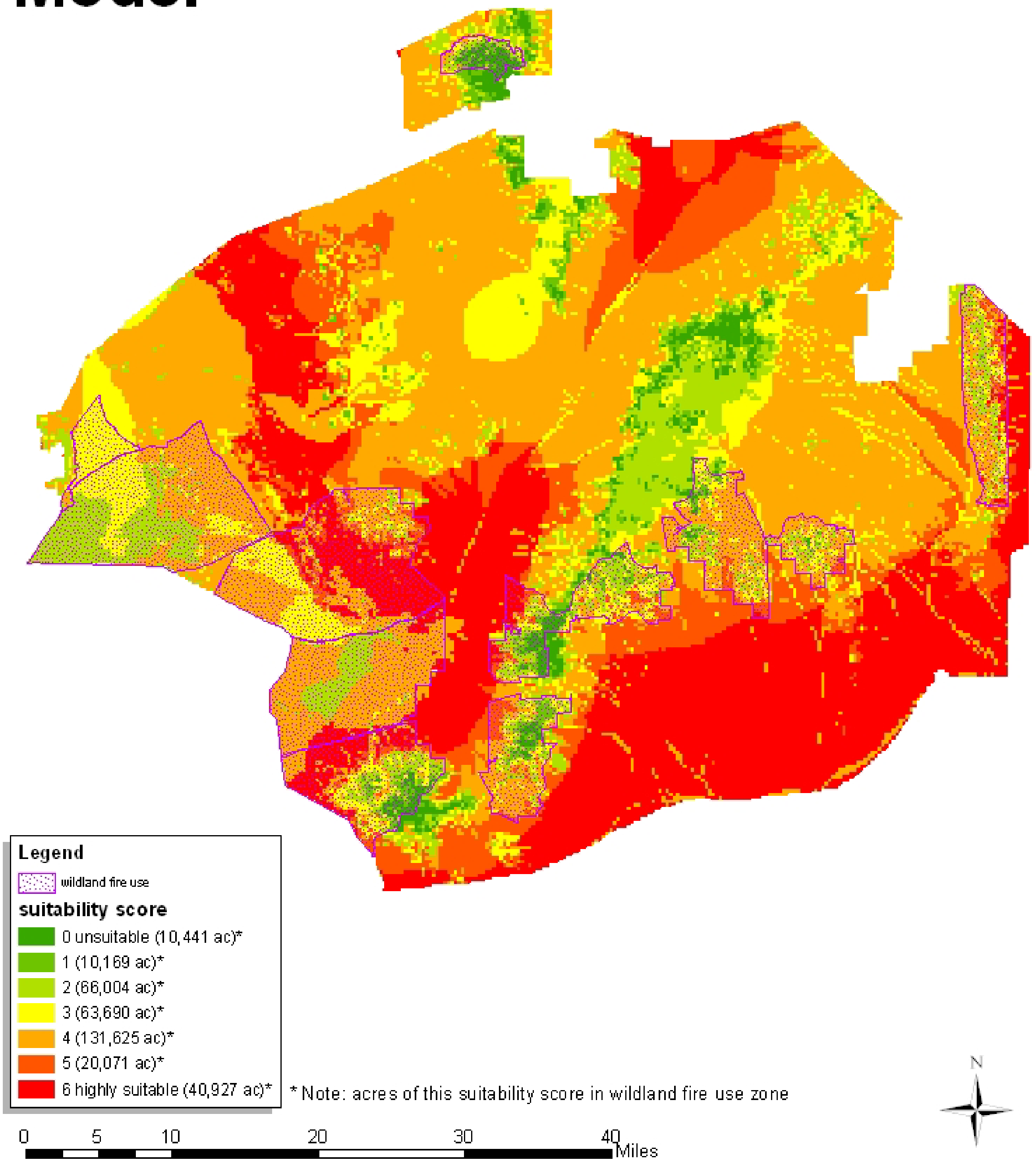
Habitat parameter	Value	Tortoise suitability score
Slope[a]	0-5 %	2
	5.1-10 %	2
	10.1-20 %	2
	20.1 – 30 %	1
	>30%	0
Elevation[b]	< 600 meters	0
	600.1 – 1000 meters	2
	1000.1 – 1500 meters	1
	> 1500 meters	0
Vegetation[c]	Barren	0
	Creosote bush mixed scrub	2
	Desert grassland and shrub steppe	1
	Desert sink	1
	Desert wash system	0
	Interior dunes	0
	Land use	0
	Lava beds	0
	Mid elevation mixed desert scrub	1
	Pinyon juniper woodland	0
	Saltbush scrub	1

[a] values derived from the digital elevation model of the National Elevation Dataset
[b] original values from the digital elevation model of the National Elevation Dataset
[c] photo-interpreted vegetation cover (Thomas et al. 2004)

Mojave National Preserve
California
Fire Management Plan

National Park Service
U.S. Department of the Interior

Figure B3: Habitat Suitability Model



Produced by S. Dingman, Biologist, Mojave National Preserve

July 2004

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3.1 Anticipated Effects of the Proposed Actions

It is the intent of the Fire Management Plan to avoid and minimize direct and indirect fire impacts to tortoises and their habitat. Anticipated effects are discussed in detail in the following paragraphs based upon these working definitions:

Fire Effects are those impacts caused by wildland fire (including flame, heat, and smoke) as fire burns across the landscape. Fire can result in direct mortality to adult tortoises, juveniles, or eggs. Fire can also cause indirect effects as a result of habitat alteration due to consumption of fuels and the post-fire vegetation response.

Suppression Effects are those impacts caused by intentional human intervention to contain, control, or extinguish wildland fire. Suppression effects can be direct, such as the accidental crushing of tortoises by firefighting equipment. Suppression can also cause indirect effects as a result of habitat alteration caused by suppression activities, such as increased shrub density or changes in species composition over time. Some of these indirect effects may be detrimental to tortoise, although the extent to which this is true and the conditions under which this might occur are unknown.

Direct: Effects that act directly upon an animal.

Indirect: Effects that do not act directly upon an animal, but are removed in space or time from the animal, such as changes to a species habitat.

Long-term: Effects that are expected to last beyond two growing seasons.

Short-term: Effects that are temporary in nature and whose influence is not expected to last beyond two growing seasons.

Tortoises lack the mobility to flee from fire, so animals caught above ground may be killed directly by exposure to flame, heat, and smoke associated with wildland fire. Animals that escape direct impact by fire may still be indirectly impacted by fire-induced habitat alteration, possibly resulting in reduced viability, reduced fecundity, increased predation, increased starvation, and increased dehydration - all resulting in reduced viability of this threatened species.

Desert tortoises have been found dead or mortally injured immediately after fires (Woodbury and Hardy 1948, Duck et al. 1997, Homer et al. 1998, Esque et al. 2003). Direct effects of fire on desert tortoise include mortality by incineration, elevating body temperature, poisoning by smoke, and asphyxiation (Whelan 1995). Tortoises occupying underground cover sites, such as burrows, caliche caves, rock shelters, and dens are less exposed to high temperature and smoke during fire. In general, deep cover sites provide more protection from fire than shallow ones. Because the desert tortoise cannot move quickly, its best chance to avoid the direct effects of fire is to already be in an underground cover site (Brooks and Esque 2002). Early season fires are potentially more threatening than mid- or late season fires because tortoises are most active aboveground during spring (Esque et al. 2003). Although spring fire temperatures may be relatively low compared to late season fires (Brooks 2002), they still appear to be high enough to kill exposed tortoises. Small individuals such as hatchlings are more at risk from lethal heating than large ones, because they have a higher surface to volume ratio that allows heat to penetrate their vital organs relatively quickly (Brooks and Esque 2002). Years or decades characterized by above average precipitation produce abundant food plants and drinking water, but also create abundant fuel loads that place tortoises at increased risk from fire (Brooks and Esque 2002). This is especially true for areas that support the invasive annual grasses cheatgrass (*Bromus* spp.) and Mediterranean grass (*Schismus* spp.) as these species result in high frequency and cover of standing dead annual grass stems that create a continuous fine fuel bed that facilitates the spread of fires (Duck et al 1997, Brooks 1999a, Esque and Schwalbe 2002, Esque et al 2003).

Indirectly, fire can negatively affect desert tortoises by reducing plant cover. The most critical indirect, short-term impact is the reduction in availability of food and water in a burned landscape. Reduction in plant cover also reduces available shelter as perennial plants, especially woody shrubs, provide protection for desert tortoises from mortality due to predators and overheating from the sun (Woodbury and Hardy 1948, Burge 1978, Mushinsky and Gibson 1991). Furthermore, the blackened landscape following a fire may increase the vulnerability of tortoises to predation as their light colored bodies contrasted with blackened substrate and sparse vegetational cover offer them little protection, particularly from predatory birds. Short-term post fire effects can include reduced availability of food plants, loss or reduction of available nutrients and trace elements, and change in seasonal availability of food plants (Nagy et al. 1998).

Indirect, long-term fire effects on tortoises are more variable, as the post-fire vegetation composition may be beneficial or detrimental to tortoises based on availability of post-fire precipitation, quality of seed bank, timing of fire, intensity of fire, fire response of various plant species, and the potential for invasion by non-native plant species. Although single fires may not produce long-term reduction in the cover of perennial plants or biomass of native annual plants (O'Leary and Minnich 1981), recurrent fire can convert native desert scrub to alien annual grasslands (Brown and Minnich 1986, Duck et al. 1997, Esque et al 2003). Such alien annual grasslands are prone to recurrent fires because alien annual grass species often increase in dominance after fire (D'Antonio and Vitousek 1992). Alien annual grassland has little shrub cover or native annual plant biomass, thus rendering the habitat inhospitable for the desert tortoise (Brooks and Esque 2002). Such landscape-level changes have the potential to reduce the local availability of suitable habitat and may introduce barriers to animal movement, thus reducing the ability of tortoises to find mates and possibly altering population structure over time. Likewise, there is the potential for fire suppression to cause indirect effects as a result of habitat alteration resulting from the lack of natural fire, such as increased shrub density, changes in species composition, and changes in community structure over time. The indirect effects of lack of fire, a result of fire suppression, may eventually be detrimental to tortoise, although the extent to which this is true and the conditions under which this might occur are unknown. This is a research need identified in the Fire Effects Monitoring and Research Plan for Mojave National Preserve.

3.2 Planned Mitigation

Protection of tortoises is first accomplished through fire management strategy zoning. Fires in desert tortoise habitat are suppressed because disturbances caused by fires are generally greater than those caused by appropriately planned fire suppression activities (Duck et al. 1997). The primary way this is accomplished is by limiting the "fire use" management strategy to those lands that are not critical tortoise habitat, and are generally unsuitable for tortoises (e.g. high elevation shrublands/woodlands and sparsely vegetated shifting substrates).

While this strategy serves to protect tortoises from direct and indirect fire effects, there are other risks posed by a fire management strategy of full suppression. Such suppression effects may be direct, such as accidental crushing of adult tortoises, juveniles, or eggs by firefighting equipment or firefighters. Suppression can also cause indirect effects as a result of habitat alteration due to changes in substrate as a result of firefighting activities, such as recontoured topography caused by creation of firelines and release of aerial water drops, compaction of soil along travel corridors, and chemical alteration of substrate due to the use of Class A foam.

To minimize these suppression effects, the following measures are incorporated into the Fire Management Plan.

- Prohibit the use of the following fire fighting tactics in Mojave National Preserve: heavy equipment (dozers, backhoes, loaders, graders), chemical fire retardant (except for Class A foam), and use of engines or other vehicles off-road.
- Use minimum-impact suppression techniques (MIST) in desert tortoise habitat.
- Unburned pockets within desert tortoise habitat may serve as important refugia, so burning out of unburned areas within the fire perimeter will be avoided to the extent that it does not compromise the containment of the fire given the predicted weather and other values at risk.
- Preseason training of firefighting personnel stationed at Hole-in-the-Wall Fire Center will be conducted by a qualified biologist to teach firefighters how to recognize and avoid tortoises and their burrows. This training will be conducted by a biologist and will include methods for moving tortoises from harm's way. The training will be based on applicable sections of the "Guidelines for Handling Desert Tortoises During Construction Projects" drafted by the Desert Tortoise Council. The Hole-in-the-Wall fire crew handles most of the initial attack in the Preserve and most fires are controlled in one operational period. Rarely do fires in Mojave National Preserve transition to extended attack.
- When working in tortoise habitat, check under tires of all firefighting vehicles whenever that vehicle has been stationary for more than 10 minutes. If any tortoises are found under the vehicle, gently and quickly move the animal to the nearest habitat that is not likely to be affected by the fire or firefighting activities following the guidelines covered in the pre-season training. Report this handling to the Resource Advisor or the Incident Commander.
- For all fires that transition from initial attack to extended attack, including those burning in critical tortoise habitat, a qualified resource advisor will be assigned to the incident to advise the Incident Commander of tortoise protection guidelines.
    - The advisor will assure that tortoise awareness is included in all shift briefings for firefighters.

  - The resource advisor will work with the incident Logistics Chief to assure that camps and other support services are located and managed to avoid impacts to tortoises or their habitat.
  - The resource advisor will work with the incident Operations Chief to assure that Mojave guidelines (e.g. prohibitions on certain firefighting tactics, use of MIST) are incorporated into operations plans.
  - Advise Operations Chief of the need to rehabilitate firelines immediately post-fire and inspect rehabilitation efforts to assure that firelines won't pose a barrier to tortoise movement or attract off-road vehicle use post-fire.
- For all fires that burn in desert tortoise habitat, a resource advisor will conduct a post-fire assessment to quantify direct mortality of tortoises, determine the potential for indirect habitat alteration, and make recommendations for implementation of burned area emergency rehabilitation including the need for post-fire tortoise population surveys. These recommendations and their implementation will be made in emergency consultation with the US Fish and Wildlife Service.

3.3 Anticipated Take

Section 9 of the Endangered Species Act of 1973, as amended, prohibits the take (ie. harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct) of a listed species without special authorization. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Under the terms of Section 7(b) and 7(o)(2) of the Endangered Species Act, taking that is incidental to and not a purpose of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with the incidental take statement.

In the case where the NPS was trying to suppress a fire and a tortoise died as a result of fire effects, the mortality would not be the result of National Park Service action. Therefore, fire effect mortality in a suppression zone would not constitute incidental take and the National Park Service would not be required to consult with the US Fish and Wildlife Service under the provisions of Section 7 or Section 9 of the Endangered Species Act. Thus, consultation is specific to incidental take resulting from suppression effects, non-fire fuel treatments, and fire effects from wildland fire use.

A literature search found one article that quantifies fire-related mortality of desert tortoise (Esque et al 2003) in the Mojave Desert. Our anticipated take calculation is based on an analysis using the reported mortality in this article and the recorded fire history of Mojave National Preserve from 1995-2003. This calculation is based on following assumptions:

- tortoise densities and fuel conditions described in the Esque et al. Mojave Desert study sites are similar to those found in wildland fire use zones in Mojave National Preserve
- the seasonality, location, and size of fires recorded in Mojave National Preserve from 1995 – 2003 adequately represents anticipated fire occurrence during the ten year life of the Fire Management Plan

- tortoises found outside of their designated critical habitat are most likely to be found in areas that have a suitability score of 5 or 6, so only the fires that occurred in wildland fire use zones and on lands that had a suitability score of 5 or 6 were used for the calculation

A recent study quantified the effects of desert wildfires on desert tortoise and other small vertebrates (Esque et al 2003).Two of the study sites were located in the Mojave Desert in fires that burned in 1993 (Table B4): Mill Creek Fire was 2 km NE of St. George, Utah, and the Bulldog Fire was on the western slope of the Beaver Dam Mountains in Utah. The study does not specify if mortality was caused by fire effects or fire suppression effects, but it is assumed from the discussion that the cause of the mortality was either undetermined or fire effects.

Table B4. Reference tortoise mortality data summarized from Esque et al. 2003

Fire	Date burned	Date surveyed	Area (ha) burned	Area (ha) surveyed	# Live tortoises	# Dead tortoises
Mill Creek	6/20/1993	6/20/1993	895	41	5	0
Bulldog	8/2/1993	8/4/1993	1079	23	1	1

Using the Esque et al. data (Table B4) as a general guide, and assuming that the live tortoises encountered in the black are impacted to the extent that they constitute take, yields mortality density estimates of:

Mill Creek = 5 tortoises/41 ha = 1 tortoise/8 ha
Bulldog = 2 tortoises/23 ha = 1 tortoise/ 12 ha

These mortality density estimates are based on fires that occurred in late June and early August and thus will be used to estimating mortality during summer fires that occur June – August. As tortoises are most active in the spring and thus more likely to be directly effected by fire, we will double (a factor of 2) the summer mortality density estimates to represent mortality in March – May. As hatchlings emerge in the autumn months but most tortoises remain in their burrows to avoid the hot daytime temperatures, we will use a factor of 1.5 of the summer mortality density estimates to represent mortality in September – November. As tortoises are mostly inactive in the cold months of winter, we will use a factor of 0.5 of the summer mortality density estimates to represent mortality in December – February. These mortality factors are shown in Table B5.

Of 146 fires recorded in Mojave National Preserve since 1995, only one fire met the following criteria: a) caused by a natural ignition, 2) located in wildland fire use zone, and 3) located in an area that has a desert tortoise suitability score of 5 or 6 as described in section 3 of this document. The fire occurred July 30, 1995 in the Kelso Mountains and burned 100 acres (41 ha), as reflected in Figure B5.

Table B5. Tortoise mortality estimate by fire effects in wildland fire use zones.

Season	Mortality factor	Total hectares burned[a]	Tortoise take: Low estimate[b]	Tortoise take: High estimate[c]
Winter (Dec–Feb)	0.5	0	0	0
Spring (Mar – May)	2	0	0	0
Summer (Jun – Aug)	1	41	3.4	5.1
Autumn (Sep – Nov)	1.5	0	0	0
Total	--	41	3.4	5.1

[a] Based on recorded fires that occurred in Mojave National Preserve 1995 – 2003 inside the wildland fire use zone and in tortoise suitability score of 5 or 6 (see Figure B2 for map of fire locations).
[b] low estimate = 1 tortoise/12 ha * mortality factor
[c] high estimate = 1 tortoise/8 ha * mortality factor

The low estimate is offered as the most reasonable estimate of anticipated take from fire effects from wildland fire use because: a) the optimal tortoise habitat is assumed to be contained in the designated critical habitat and that habitat is all zoned for suppression so those fire effects are excluded from this take analysis, and b) the areas of tortoise suitability score of 5 or 6 used in this analysis are outside of the designated critical habitat, and c) the suitability model does not account for other habitat factors that might make otherwise suitable habitat inhospitable to tortoise (e.g. shifting substrates), so 4) the tortoise density in those score 5 or 6 lands outside of the critical habitat is likely low, thus the low take estimate is most reasonable.

Suppression impacts and fuel management impacts are harder to quantify. With the mitigation measures outlined in section 3.2 this take should be minimal; however, it is still possible that a tortoise might be injured. Based on firefighter accounts of the frequency of their tortoise encounters during fire suppression activities and recorded road-kills in general within the Preserve, we anticipate a take of no more than 5 tortoises due to suppression activities over the ten year life of this plan. Because fuel management activities are pre-planned, additional mitigation measures may be implemented as warranted (e.g. on-site tortoise monitor), and that fuel management activities take place during winter months when tortoises are inactive, we anticipate a take of 0 tortoises due to fuel management activities.

Based on the above discussion, we anticipate an incidental take of up to 8 tortoises (3 for fire effects in wildland fire use + 5 for suppression impacts + 0 for fuel management) over the ten year life of this Fire Management Plan.

3.4 Cumulative Effects

Cumulative effects are those impacts of future State and Federal actions that are reasonably certain to occur in the project area. Future Federal actions will be subject to the consultation requirements established in section 7 of the Endangered Species Act, and, therefore, are not considered cumulative to the proposed project. There are no known state actions that are likely to occur in the project area.

4.0 Project Reporting

The U.S. Fish and Wildlife Service Ventura Office will be contacted for emergency consultation as needed when a fire exceeds 10 acres or requires extended attack and a resource advisor is assigned to the incident. The resource advisor will determine if suppression actions or fire activity may affect desert tortoises or any other listed species and will make the recommendation for emergency consultation to the Incident Commander. Upon approval from the Incident Commander, the resource advisor will initiate emergency consultation to obtain specific recommendations on ways to minimize take and mortality and to coordinate with U.S. Fish and Wildlife Service if any take does occur. Likewise, the resource advisor assigned to the incident or the wildlife biologist assigned to the Burned Area Emergency Response team will initiate emergency consultation if post-fire impacts or proposed treatments to mitigate post-fire impacts have the potential to affect a listed species.

Dead or injured desert tortoise (adults, juveniles, or eggs) located during fire management, fire suppression or post-fire rehabilitation activities will be documented in a post-fire assessment report. To the extent practicable, the cause of injury or death will be reported (e.g. fire effect or fire suppression effect). The location of dead or injured tortoises will be reported as well as whether that location is in a fire use or fire suppression zone and whether that location is in critical habitat. The purpose of these details are to enable the Preserve and the U.S. Fish and Wildlife Service to improve upon these mitigation guidelines in future drafts based on a better understanding of the relationship between fire, fire suppression, and tortoises. The U.S. Fish and Wildlife Service Ventura Office will receive a copy of all post-fire assessment reports.

5.0 Preparers

This Biological Assessment was prepared by:

Sandee Dingman, Biologist, (760) 928-2078
Mojave National Preserve P.O. Box 96 Cima, California 92323

In consultation with:

Creed Clayton, Biologist, (805) 644-1766
US Fish and Wildlife Service 2493 Portola Road, Suite B Ventura, California 93003

And reviewed by:

Mojave National Preserve 222 East Main Street, Suite 202 Barstow, California 92311

Chuck Heard, Fire Management Officer, (760) 255-8849
Debra Hughson, Science Advisor, (760) 255-8826
Larry Whalon, Chief of Resource Management, (760) 255-8818
Dannette Woo, Compliance Specialist, (760) 255-8841

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